Pre-Calculus 20 Math Rubrics

P20.1a Student demonstrates understanding of the absolute value of real numbers.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can determine the absolute value of a real number. I can order a set of real numbers. I can simplify expressions involving absolute value with one or two steps.	I can simplify expressions involving absolute value with more than 2 steps.	I can explain with the use of examples how absolute value fits into the order of operations.

P20.1b Student demonstrates understanding of the absolute value of equations and functions involving

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can create a table of values for an absolute value function. I can sketch the graph of $y = \|f(x)\|$ given the graph of f(x). I can determine the intercepts, domain, and range, given a graph. I can algebraically determine the solution set of an equation involving absolute values.	I can describe the relationship between the graph of y=f(x) and its absolute value. I can determine the intercepts, domain, and range, given its equation. I can algebraically determine the solution set of a complex equation involving absolute values including those with extraneous roots. My solutions may involve simplifying errors.	I can identify and correct errors in a solution. I can solve situational questions. I am able to explain level 2 & 3 questions.

the absolute value of linear and quadratic functions by graphing and analyzing.

P20.2a Student expands and demonstrates understanding of radicals with numerical and variable radicands including computations.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can express entire radicals as mixed radicals and vice versa. I can order a set of real numbers which includes radical expressions. I can simplify basic radical expressions. I can rationalize a square root monomial denominator.	I can solve more complicated radical expressions. I can rationalize cube root and binomial denominators. I can determine the values of a variable for which a given radical expression is defined.	I can explain level 2 and 3 questions. I can solve situational questions. I express all answers in simplest terms.

P20.2b Student expands and demonstrates understanding of radicals with numerical and variable

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria	I can determine and verify solutions of basic radical equations that can be simplified to a single radical and constant term.	I can determine and verify solutions of radical equations containing unlike radicals or quadratic results.	I can solve situational questions. I can identify extraneous solutions.

radicands including solving equations (limited to square roots and one or two radicals).

P20.3a Student expands and demonstrates understanding of rational expressions and equations (up to and including degree 2 numerators and denominators) including equivalent forms of expressions.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I need more help with becoming consistent with the criteria.	I can determine equivalent rational expressions. I can verify whether or not a value is permissible or not.	I can factor and simplify rational expressions but may	I can explain level 2 and 3 questions.

	I can determine non-permissible values. I can simplify basic rational expressions in factored form.	make simplifying errors.	I express all answers in simplest form.

P20.3b Student expands and demonstrates understanding of rational expressions and equations (up to and including degree 2 numerators and denominators) including operations on expressions.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can multiply and divide rational expressions with some small calculation errors. I can add and subtract rational expressions with common denominators.	I can add and subtract rational expressions without common denominators. I can simplify rational expressions that involve 2 or more operations.	I can explain level 2 and 3 questions and list all non-permissible values. I can solve situational questions when not given the expression. I express all answers in simplest form.

P20.3c Student expand and demonstrate understanding of rational expressions and equations (up to and including degree 2 numerators and denominators) including solving equations that can be simplified to linear or quadratic equations.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can solve equations involving rational expressions in factored form.	I can solve equations involving rational expressions involving factoring. I can verify why a value may not be a solution.	I can solve situational questions when not given the equation.

P20.4 Student expands and demonstrates understanding of the primary trigonometric ratios including the use of reference angles ($0° \leq \theta \leq 360°$) and the determination of exact values for trigonometric ratios.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can demonstrate understanding of: - standard position of an angle and quadrants - (+/-) signs of trig ratios and the CAST rule - location of angles on the coordinate plane I can determine and apply reference angles. I can determine exact trig values given a point on the terminal arm.	I can determine exact trig values given an angle with the use of special triangles. I can solve basic trig equations such as sin B = a.	I solve contextual problems, using trig ratios. I identify angles for which the tangent ratio does not exist and explain why.

P20.5 Student demonstrates understanding of the cosine law and sine law, including the ambiguous case.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can solve for a missing side or angle (excluding ambiguous case) when the diagram is given (including those in situational questions).	I can solve situational questions involving non-right triangles (excluding the ambiguous case). I can determine the missing side or angle in a given triangle involving the ambiguous case.	I can explain the steps in a proof of the sine law and cosine law. I can illustrate and explain the possibilities for a given set of measurements for the ambiguous case. I can perform error analysis. I can solve situational problems that involve the ambiguous case.

P20.6 Student expands and demonstrates understanding of factoring polynomial expressions including those of the form:

- $a^2x^2 - b^2y^2$, $a \neq 0, b \neq 0$; $a(f(x))^2 - b(f(x)) + c$, $a \neq 0$; $a^2(f(x))^2 - b^2(g(y))^2$, $a \neq 0, b \neq 0$

where a, b, and c are rational numbers.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)

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I need more help with becoming consistent with the criteria.	I can demonstrate the process of factoring single-step expressions.	I can factor multi-step expressions. I can demonstrate the process of factoring composite functions.	I can fully factor composite functions and write all answers in simplified form.

P20.7a Student demonstrates understanding of quadratic functions of the form $y = a(x - p)^2 + q$ and of their graphs, including:
- vertex
- domain and range
- direction of opening
- axis of symmetry
- x- and y-intercepts.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can find the coordinates of the vertex, describe the width, and direction of opening.	I can find the domain and range, axis of symmetry and the number of x intercepts. I can write a quadratic function that represents a given graph or set of characteristics.	I can explain and do level 2 and 3 questions.

P20.7b Student demonstrates understanding of quadratic functions of the form $y=ax^2+bx+c$ and of their graphs, including:
- vertex
- domain and range
- direction of opening
- axis of symmetry
- x- and y-intercepts.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can find 5/7 of the following: vertex, domain and range, axis of symmetry, y-intercepts, number of x- intercepts and direction of opening.	I can sketch the graph of a quadratic function in the form of $y=ax^2+bx+c$. I can find the following: vertex, domain and range, axis of symmetry, y-intercepts, number of x intercepts and direction of opening. I can change an equation from standard to vertex form.	I can explain level 2 and 3 questions. I can evaluate a quadratic function that models a given situation and explain any assumptions. I can identify and correct errors in a given example of completing the square.

P20.8a Student demonstrates understanding of quadratic equations including the solution of systems of linear-quadratic and quadratic-quadratic equations in two variables.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can determine the number of solutions to a system given the graph. I can solve linear quadratic systems algebraically. I can state the solution to a system of equations given the graph.	I can solve quadratic-quadratic systems algebraically.	I can solve situational questions involving systems of equations. I can illustrate how a system may have zero, one, two or an infinite number of solutions.

P20.8b Student demonstrates understanding of quadratic equations including the solution of single variable equations.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)

I need more help with becoming consistent with the criteria.	I can solve factorable quadratic equations using any method. I can solve quadratic equations given a graph.	I can solve quadratic equations which are not factorable using multiple methods, including factoring, completing the square and the quadratic formula. I can use the discriminant to determine the number of real roots for a quadratic equation.	I can articulate the advantages / disadvantages of different strategies for solving quadratic equations. I can identify and correct any errors within a solution. I can factor using completing the square. I express all answers in simplest form.

P20.9a Student expands and demonstrates understanding of inequalities including two-variable linear and quadratic inequalities.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can use test points to determine the solution region. I can correctly use a solid or broken line when graphing a solution. I can determine the solution region for two variable linear inequalities.	I can determine the solution region for two variable quadratic inequalities.	I can explain level 2 and 3 questions.

P20.9b Student demonstrates understanding of quadratic equations including the solution of single variable equations.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can apply a strategy such as case analysis, graphing, roots and test points, or sign analysis to solve one variable inequalities. I may not use proper notation to identify the correct interval.	I can solve situational questions involving a one variable inequality.	I can explain level 2 and 3 questions. I use proper notation to identify the interval.

P20.10a Student demonstrates understanding of arithmetic sequences and series.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can generate an arithmetic sequence. I can identify arithmetic series. I can find a, n, d, or t_n involving single steps.	I can determine a, n, d, or t_n in multi-step problems. I can solve questions with variable answers.	I can solve situational questions. I can answer theoretical questions.

P20.10b Student demonstrates understanding of geometric (finite and infinite) sequences and series.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming consistent with the criteria.	I can generate a geometric sequence. I can identify geometric sequences. I can find a, n, r, or t_n involving single steps.	I can do multi-step substitutions. I can do basic word problems.	I can determine a, n, r, or t_n in situational questions. I can answer theoretical questions.

P20.11 Student demonstrates understanding of reciprocal functions of:
- linear functions
- quadratic functions.

Beginning (1)	Approaching (2)	Meeting (3)	Exemplary (4)
I need more help with becoming	I can determine the non-permissible values. I can find the equation of the reciprocal given y=f(x) and vice versa.	I can sketch the graph of a reciprocal	I can explain level 2 and 3 questions.

consistent with the criteria.	I can graph the reciprocal given the graph of y=f(x).	function given the equation y=f(x).	